Allied Telesyn AR410/CISCO 2600 RIP v2 Interoperability

A guide to RIPv2 interoperability between an Allied Telesyn AR410 router and a CISCO 2600 router.

Introduction

This technical note provides an introduction to the *Routing Information Protocol* (RIP), and a method of obtaining interoperability between your Allied Telesyn AR410 and CISCO 2600 routers. The scenario described in this technical note describes the configuration for Allied Telesyn software release 2.4.1 patch 05, and CISCO operating system 12.2.

If you require more information, or support, on this topic please contact your nearest Alllied Telesyn reseller or distributor.

What is RIP?

Routing Information Protocol (RIP) is described fully in RFC 1058. Extensions for RIP version 2 are described in RFC 1723. Extensions for RIP on demand are described in RFC 1582. RIP is a fairly simple distance vector protocol which defines networks based on how many hops they are from the router. Once a network is more than 15 hops away (one hop is one link) it is not included in the routing table.

The possible routes (there may be more than one) to a particular host are selected on the basis of the shortest one. If two routes have the same metric (hop count) or cost the first one found will be chosen. RIP does not cope very well with a meshed (multiply connected) network. It suits star topologies very well.

RIP can have multiple links to a particular destination. It will choose the best one based simply on the metric, which for RIP, is either administratively assigned, or is the hop count (i.e. number of links). RIP can not send data over multiple paths to a destination. Once a route is chosen, all data is sent over this path until the metric changes. OSPF routing is required if load balancing is required over multiple paths. Routes with equal cost are kept (and possibly used) for RIP, EGP and OSPF.

Each router configured for RIP maintains a relatively simple route table as described earlier. The router will periodically broadcast its routing information

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to other routers. Similarly it will need to obtain this information from neighbouring routers to improve its own picture of the network. Routes are removed from the table if they are not kept up to date (refreshed) by the neighbouring routers.

The RIP version 2 extensions allow the RIP updates to contain subnet masks and next hop information. The ability to carry subnet masks allows the use of different sized subnet masks on different subnets within the same network.

The RIP on demand extensions allow RIP to be used over demand links that are activated only when there is traffic to send. Route information is only exchanged when there is a change in the routing table and routes obtained over the link are not aged.
RIP broadcasts are automatically enabled when at least one RIP neighbour is defined.

What is MD5?

MD5 is an algorithm which verifies data integrity through the creation of a 128-bit message digest from data input (which may be a message of any length) that is claimed to be as unique to that specific data as a fingerprint is to the specific individual. MD5 is used with digital signature applications, which require that large files must be compressed by a secure method before being encrypted with a secret key, under a public key cryptosystem.

A digital signature (not to be confused with a digital certificate) is an electronic signature used to authenticate the identity of the sender of a message or the signer of a document, and possibly to ensure that the original content of the message or document that has been sent is unchanged. Digital signatures are easily transportable, cannot be imitated by someone else, and can be automatically time-stamped. The ability to ensure that the original signed message arrived means that the sender cannot easily repudiate it later.

A digital signature can be used with any kind of message, whether it is encrypted or not, simply so that the receiver can be sure of the sender's identity and that the message arrived intact. A digital certificate contains the digital signature of the certificate-issuing authority so that anyone can verify that the certificate is real.

What are plain text passwords?

Plain text passwords (also known as *clear text passwords*) are unencrypted sequences of characters that allow you to connect to other machines on a network. If you read your mail on a Unix machine, for example, you send it your login ID and your password so that you can gain access.

The main drawback of plain text passwords is that the program that you use to connect to your machine will generally send your ID and your password as is over the network. This setup could potentially allow malicious users to intercept or *sniff* your password as it travels across the network. Since the password is unencrypted, it will appear as you typed it.

The following configurations describe the syntax for configuring RIP v2 on an Allied Telesyn AR410 router, and the syntax for configuring a CISCO 2600

router, firstly using *plain text password authentication*, and secondly using *MD5 authentication*.

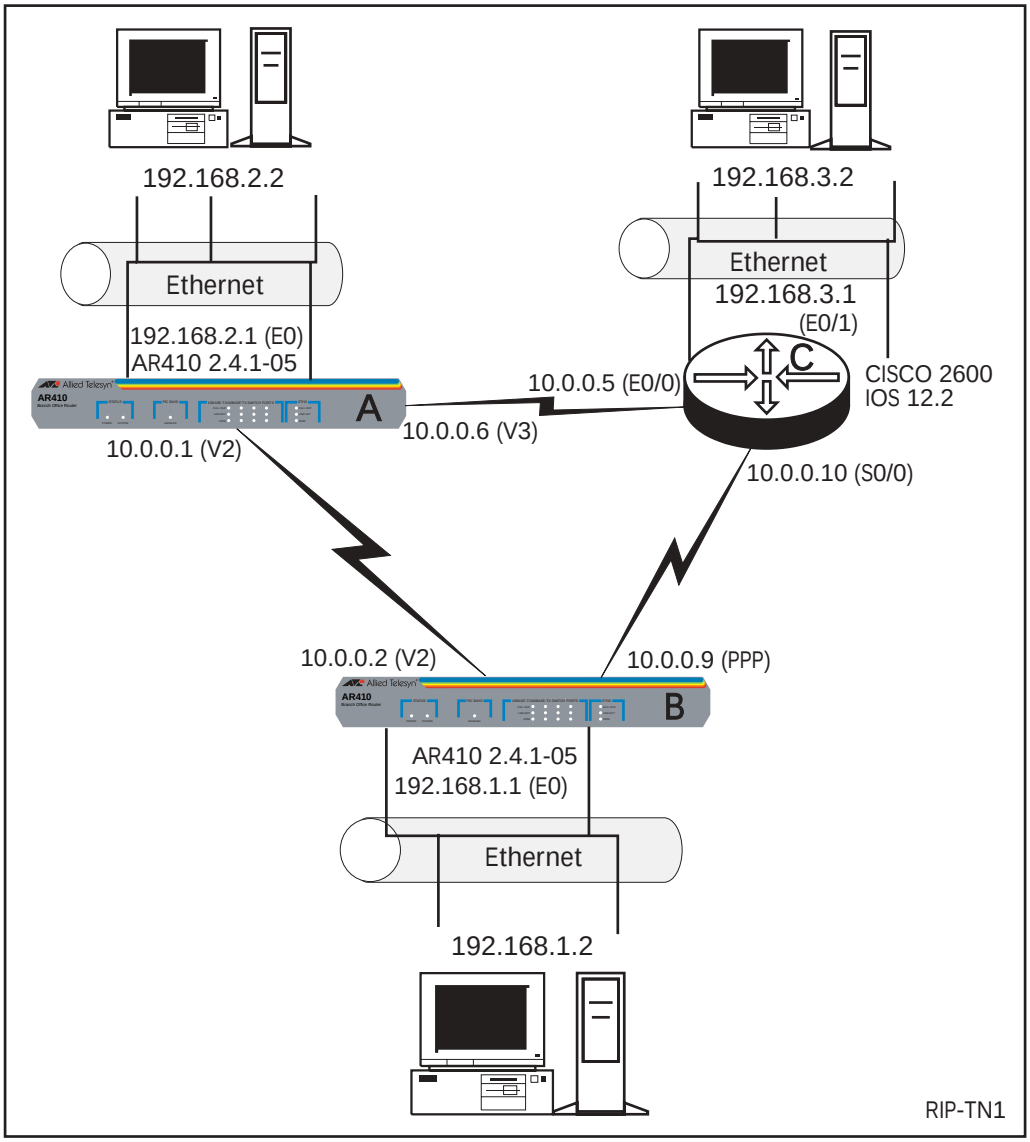
Configuring the Routers

This section describes the steps for configuring the AR410 and the CISCO 2600 routers for the scenario illustrated in Figure 1.

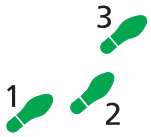
Figure 1 shows two AR410 routers (labelled A and B) connected in a ring with a CISCO 2600 router (labelled C). Port 2 of router A is connected to the Eth 0/0 port of router C. Port 1 of router A is connected to port 1 of router B. A Syn PIC (AR023) is inserted into the PIC bay of router B, which is connected to a Sync interface in a WAN slot of router C.

The steps for configuration begin on page -4.

Figure 1: Configuration setup for AR410 and CISCO 2600 routers.



Configuration for ATR Routers A and B Using Plain Text Password Authentication



1. Configuration of Router A

VLAN general configuration

```
create vlan="vlan2" vid=2

create vlan="vlan3" vid=3
```

VLAN port configuration

```
add vlan="vlan2" port=1

add vlan="vlan3" port=2
```

IP configuration

```
enable ip

add ip int=eth0 ip=192.168.2.1

add ip int=vlan2 ip=10.0.0.1 mask=255.255.255.252

add ip int=vlan3 ip=10.0.0.6 mask=255.255.255.252

add ip rip int=vlan2 send=rip2 receive=rip2 auth=pass

set ip rip int=vlan2 pass=sierra

add ip rip int=vlan3 send=rip2 receive=rip2 auth=pass

set ip rip int=vlan3 pass=sierra

add ip rip int=eth0 send=rip2 receive=rip2 auth=pass

set ip rip int=eth0 pass=sierra
```

The passwords you are sending and expecting to receive must be the same on all VLANs.

```
Manager Router A> sh ip route
```

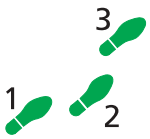
Figure 2: Output of the SHOW IP ROUTE command for ATR Router A.

```
 IP Routes
---------------------------------------------------------------------------
Destination       Mask              NextHop            Interface          Age
DLCI/Circ.        Type     Policy   Protocol           Metrics      Preference
---------------------------------------------------------------------------
10.0.0.0          255.255.255.252   0.0.0.0            vlan2               68
-                 direct   0        interface          1                    0
10.0.0.4          255.255.255.252   0.0.0.0            vlan3               68
-                 direct   0        interface          1                    0
10.0.0.4          255.255.255.252   10.0.0.2           vlan2               53
-                 remote   0        rip                3                  100
10.0.0.8          255.255.255.252   10.0.0.5           vlan3               53
-                 remote   0        rip                2                  100
10.0.0.8          255.255.255.252   10.0.0.2           vlan2               67
-                 remote   0        rip                2                  100
10.0.0.9          255.255.255.255   10.0.0.5           vlan3               53
-                 remote   0        rip                2                  100
192.168.1.0       255.255.255.0     10.0.0.2           vlan2               67
-                 remote   0        rip                2                  100
192.168.2.0       255.255.255.0     0.0.0.0            eth0                68
direct   0        interface         1                  0
192.168.2.0       255.255.255.0     10.0.0.2           vlan2               53
-                 remote   0        rip                4                  100
192.168.3.0       255.255.255.0     10.0.0.5           vlan3               53
-                 remote   0        rip                2                  100
---------------------------------------------------------------------------
```

```
Manager Router A> sh ip rip
```

Figure 3: Output of the SHOW IP RIP command for ATR Router A.

```
Interface  Circuit/DLCI    IP Address      Send  Receive STC  Dmd  Auth  Password
-------------------------------------------------------------------------------
vlan2      -               -               RIP2  RIP2    YES  OFF  PASS  ********
vlan3      -               -               RIP2  RIP2    YES  OFF  PASS  ********
eth0       -               -               RIP2  RIP2    YES  OFF  PASS  ********
-------------------------------------------------------------------------------
```



2. Configuration of Router B

VLAN general configuration

```
create vlan="vlan2" vid=2
```

VLAN port configuration

```
add vlan="vlan2" port=1
```

PPP configuration

```
create ppp=0 over=syn0

set ppp=0 over=syn0 lqr=off
```

IP configuration

```
enable ip

add ip int=vlan2 ip=10.0.0.2 mask=255.255.255.252

add ip int=ppp0 ip=10.0.0.9 mask=255.255.255.252

add ip int=eth0 ip=192.168.1.1

add ip rip int=vlan2 send=rip2 receive=rip2 auth=pass

set ip rip int=vlan2 pass=sierra

add ip rip int=ppp0 send=rip2 receive=rip2 auth=pass

set ip rip int=ppp0 pass=sierra

add ip rip int=eth0 send=rip2 receive=rip2 auth=pass

set ip rip int=eth0 pass=sierra

Manager Router B> sh ip route
```

Figure 4: Output of the SHOW IP ROUTE command for ATR Router B.

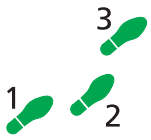
```
IP Routes
-------------------------------------------------------------------------------
Destination       Mask              NextHop             Interface          Age
DLCI/Circ.        Type     Policy   Protocol            Metrics      Preference
-------------------------------------------------------------------------------
10.0.0.0          255.255.255.252   0.0.0.0             vlan2               92
-                 direct   0        interface           1                    0
10.0.0.4          255.255.255.252   10.0.0.10           ppp0                74
-                 remote   0        rip                 2                  100
10.0.0.4          255.255.255.252   10.0.0.1            vlan2               88
-                 remote   0        rip                 2                  100
10.0.0.8          255.255.255.252   0.0.0.0             ppp0                92
-                 direct   0        interface           1                    0
10.0.0.8          255.255.255.252   10.0.0.1            vlan2               74
-                 remote   0        rip                 3                  100
10.0.0.9          255.255.255.255   10.0.0.1            vlan2               74
-                 remote   0        rip                 3                  100
192.168.1.0       255.255.255.0     0.0.0.0             eth0                92
-                 direct   0        interface           1                    0
192.168.1.0       255.255.255.0     10.0.0.1            vlan2               74
-                 remote   0        rip                 4                  100
192.168.2.0       255.255.255.0     10.0.0.1            vlan2               88
-                 remote   0        rip                 2                  100
192.168.3.0       255.255.255.0     10.0.0.10           ppp0                74
-                 remote   0        rip                 2                  100
-------------------------------------------------------------------------------
```

```
Manager Router B> sh ip rip
```

Figure 5: Output of the SHOW IP RIP command for ATR Router B

```
Interface  Circuit/DLCI    IP Address      Send  Receive  Dmd  Auth  Password
-------------------------------------------------------------------------------
vlan2      -               -               RIP2  RIP2     OFF  PASS  ********
ppp0       -               -               RIP2  RIP2     OFF  PASS  ********
eth0       -               -               RIP2  RIP2     OFF  PASS  ********
-------------------------------------------------------------------------------
```

Configuration for CISCO Router C Using Plain Text Authentication



3. Configuration of Router C

```
hostname Router
!
ip subnet-zero
!
key chain ka1
key 1
key-string sierra
!
interface FastEthernet0/0
ip address 10.0.0.5 255.255.255.252
ip rip authentication key-chain ka1
half-duplex
no keepalive
no shutdown
!
interface Serial0/0
ip address 10.0.0.10 255.255.255.252
ip rip authentication key-chain ka1
encapsulation ppp
no keepalive
```

```
no fair-queue
clockrate 64000
no shutdown
!
interface FastEthernet0/1
ip address 192.168.3.1 255.255.255.0
no keepalive
half-duplex
no shutdown
!
router rip
version 2
network 10.0.0.0
network 192.168.3.0
!
ip classless
!
line con 0
line aux 0
line vty 0 4
login
```

```
Router#sh ip route
```

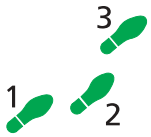
Figure 6: Output of the SHOW IP ROUTE command for CISCO Router C.

```
Codes:
 C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
 D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
 N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
 i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
 * - candidate default, U - per-user static route, o - ODR
 P - periodic downloaded static route

 Gateway of last resort is not set
 10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
 C 10.0.0.8/30 is directly connected, Serial0/0
 C 10.0.0.9/32 is directly connected, Serial0/0
 R 10.0.0.0/30 [120/1] via 10.0.0.6, 00:00:05, Ethernet0/0
 [120/1] via 10.0.0.9, 00:00:05, Serial0/0
 C 10.0.0.4/30 is directly connected, Ethernet0/0
 R 192.168.1.0/24 [120/1] via 10.0.0.9, 00:00:05, Serial0/0
 R 192.168.2.0/24 [120/1] via 10.0.0.6, 00:00:05, Ethernet0/0
 C 192.168.3.0/24 is directly connected, Ethernet0/1
 Router#
```

Configuration for ATR Routers A and B Using MD5 Authentication

The following scenario describes exactly the same configuration as the one above, this time using MD5 authentication.



1. Configuration of Router A

VLAN general configuration

```
create vlan="vlan2" vid=2
```

VLAN port configuration

```
add vlan="vlan2" port=1
```

PPP configuration

```
create ppp=0 over=syn0

set ppp=0 over=syn0 lqr=off
```

IP configuration

```
enable ip

add ip int=eth0 ip=192.168.2.1

add ip int=vlan2 ip=10.0.0.1 mask=255.255.255.252

add ip int=vlan3 ip=10.0.0.6 mask=255.255.255.252

add ip rip int=vlan2 send=rip2 receive=rip2 auth=md5

set ip rip int=vlan2 pass=sierra

add ip rip int=vlan3 send=rip2 receive=rip2 auth=md5

set ip rip int=vlan3 pass=sierra

add ip rip int=eth0 send=rip2 receive=rip2 auth=md5

set ip rip int=eth0 pass=sierra
```

```
Manager Router A> sh ip route
```

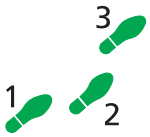
Figure 7: Output of the SHOW IP ROUTE command for ATR router A.

```
--------------------------------------------------------------------------------
Destination       Mask                NextHop          Interface             Age
DLCI/Circ.        Type     Policy     Protocol         Metrics         Preference
 ------------------------------------------------------------------------------
10.0.0.0          255.255.255.252     0.0.0.0          vlan2                  63
-                 direct   0          interface        1                       0
10.0.0.4          255.255.255.252     0.0.0.0          vlan3                  63
-                 direct   0          interface        1                       0
10.0.0.4          255.255.255.252     10.0.0.2         vlan2                  43
-                 remote   0          rip              3                     100
10.0.0.8          255.255.255.252     10.0.0.5         vlan3                  44
-                 remote   0          rip              2                     100
10.0.0.8          255.255.255.252     10.0.0.2         vlan2                  62
-                 remote   0          rip              2                     100
10.0.0.9          255.255.255.255     10.0.0.5         vlan3                  44
-                 remote   0          rip              2                     100
192.168.1.0       255.255.255.0       10.0.0.2         vlan2                  62
-                 remote   0          rip              2                     100
192.168.2.0       255.255.255.0       0.0.0.0          eth0                   63
-                  direct  0          interface        1                       0
192.168.2.0       255.255.255.0       10.0.0.2         vlan2                  43
-                 remote   0          rip              4                     100
192.168.3.0       255.255.255.0       10.0.0.5         vlan3                  44
-                 remote   0          rip              2                     100
```

```
Manager Router A> sh ip rip
```

Figure 8: Output of the SHOW IP RIP command for ATR router A.

```
Interface  Circuit/DLCI    IP Address      Send  Receive  Dmd  Auth  Password
-------------------------------------------------------------------------------
vlan2      -               -               RIP2  RIP2     OFF  MD5   ********
vlan3      -               -               RIP2  RIP2     OFF  MD5   ********
eth0       -               -               RIP2  RIP2     OFF  MD5   ********
-------------------------------------------------------------------------------
```



2. Configuration of Router B

VLAN general configuration

```
create vlan="vlan2" vid=2
```

VLAN port configuration

```
add vlan="vlan2" port=1
```

PPP configuration

```
create ppp=0 over=syn0
set ppp=0 over=syn0 lqr=off
```

IP configuration

```
enable ip
add ip int=vlan2 ip=10.0.0.2 mask=255.255.255.252
add ip int=ppp0 ip=10.0.0.9 mask=255.255.255.252
add ip int=eth0 ip=192.168.1.1
add ip rip int=vlan2 send=rip2 receive=rip2 auth=md5
set ip rip int=vlan2 pass=sierra
add ip rip int=ppp0 send=rip2 receive=rip2 auth=md5
set ip rip int=ppp0 pass=sierra
add ip rip int=eth0 send=rip2 receive=rip2 auth=md5
set ip rip int=eth0 pass=sierra
```

```
Manager Router B>  sh ip route
```

Figure 9: Output of the SHOW IP ROUTE command for ATR router B.

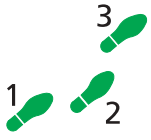
```
-------------------------------------------------------------------------------
Destination       Mask                NextHop          Interface             Age
DLCI/Circ.        Type     Policy     Protocol         Metrics         Preference
-------------------------------------------------------------------------------
10.0.0.0          255.255.255.252     0.0.0.0          vlan2                  80
-                 direct   0          interface        1                       0
10.0.0.4          255.255.255.252     10.0.0.10        ppp0                   57
-                 remote   0          rip              2                     100
10.0.0.4          255.255.255.252     10.0.0.1         vlan2                  76
-                 remote   0          rip              2                     100
10.0.0.8          255.255.255.252     0.0.0.0          ppp0                   80
-                 direct   0          interface        1                       0
10.0.0.8          255.255.255.252     10.0.0.1         vlan2                  57
-                 remote   0          rip              3                     100
10.0.0.9          255.255.255.255     10.0.0.1         vlan2                  57
-                 remote   0          rip              3                     100
192.168.1.0       255.255.255.0       0.0.0.0          eth0                   80
-                 direct   0          interface        1                       0
192.168.1.0       255.255.255.0       10.0.0.1         vlan2                  57
-                 remote   0          rip              4                     100
192.168.2.0       255.255.255.0       10.0.0.1         vlan2                  76
-                 remote   0          rip              2                     100
192.168.3.0       255.255.255.0       10.0.0.10        ppp0                   57
-                 remote   0          rip              2                     100
```

```
Manager Router B> sh ip rip
```

Figure 10: Output of the SHOW IP RIP command for ATR Router B.

```
Interface  Circuit/DLCI    IP Address      Send  Receive  Dmd  Auth  Password
-------------------------------------------------------------------------------
vlan2      -               -               RIP2  RIP2     OFF  MD5   ********
ppp0       -               -               RIP2  RIP2     OFF  MD5   ********
eth0       -               -               RIP2  RIP2     OFF  MD5   ********
-------------------------------------------------------------------------------
```

Configuration for CISCO Router C Using MD5 Authentication



3. Configuration of Router C

```
hostname Router
!
ip subnet-zero
!
key chain ka1
```

```
key 1
key-string sierra
!
interface FastEthernet0/0
ip address 10.0.0.5 255.255.255.252
ip rip authentication mode md5
ip rip authentication key-chain ka1
half-duplex
no keepalive
no shutdown
!
interface Serial0/0
ip address 10.0.0.10 255.255.255.252
ip rip authentication mode md5
ip rip authentication key-chain ka1
encapsulation ppp
no keepalive
no fair-queue
clockrate 64000
no shutdown
!
interface FastEthernet0/1
ip address 192.168.3.1 255.255.255.0
ip rip authentication mode md5
ip rip authentication key-chain ka1
no keepalive
half-duplex
no shutdown
!
router rip
```

```
version 2

network 10.0.0.0

network 192.168.3.0

!

ip classless

ip http server

ip pim bidir-enable

!

line con 0

line aux 0

line vty 0 4

login

!


Router#sh ip route
```

Figure 11: Output of the SHOW IP ROUTE command for CISCO Router C.

```
Codes:
C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set
10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C 10.0.0.8/30 is directly connected, Serial0/0
C 10.0.0.9/32 is directly connected, Serial0/0
R 10.0.0.0/30 [120/1] via 10.0.0.6, 00:00:20, Ethernet0/0
[120/1] via 10.0.0.9, 00:00:20, Serial0/0
C 10.0.0.4/30 is directly connected, Ethernet0/0
R 192.168.1.0/24 [120/1] via 10.0.0.9, 00:00:20, Serial0/0
R 192.168.2.0/24 [120/1] via 10.0.0.6, 00:00:20, Ethernet0/0
C 192.168.3.0/24 is directly connected, Ethernet0/1

Router#
```